National Aeronautics and Space Administration

# THE CRITICAL PATH

A FLIGHT PROJECTS DIRECTORATE PUBLICATION | 2018 SPRING ISSUE

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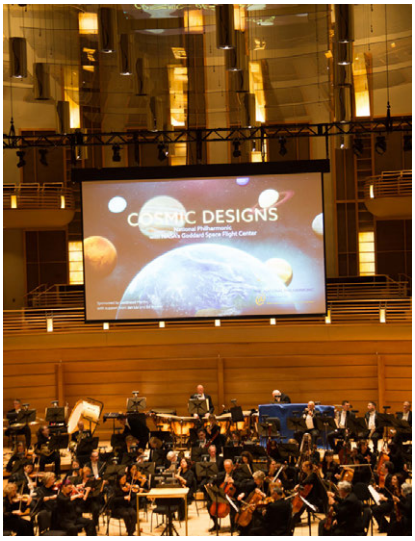



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THE CRITICAL PATH

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HAVE A STORY IDEA, NEWS ITEM OR LETTER FOR THE CRITICAL PATH?

Please let us know about it.

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Don't forget to include your name and phone number.

*The deadline for the next issue is July 16, 2018*

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# HELLO....

The Flight Projects Directorate has been busy! Since the last Critical Path newsletter our teams successfully launched TSIS, GOLD, GOES-S and TESS.

On-orbit checkout and handover of these missions are going well, TSIS was handed over to operation by the Earth Science Mission Operations (ESMO) in March. Additionally, the checkout and handover of the previously launched TDRS-M and JPSS-1 spacecraft have been completed. "M" is the last in the TDRS-KLM series and JPSS-1 is the first in its series, key milestones for two project teams that have worked hard and well to deliver on commitments. Regarding recent significant deliveries on the ground, the JWST OTIS was delivered to the spacecraft facility in California and the Advanced Topographic Laser Altimeter System (ATLAS) instrument was delivered and integrated to the Ice, Cloud and land Elevation Satellite (ICESat)-2 spacecraft in Arizona. Also anticipated this calendar year are the launches of Ionospheric Connection Explorer (ICON), Parker Solar Probe (PSP), ICESat-2, MetOp-C, Global Ecosystem Dynamics Investigation (GEDI) and Robotic Refueling Mission (RRM)-3. Additionally, the WFIRST mission had a very successful Systems Requirements Review (SRR) in March.

Members of the front office and I met with the GEDI and PSP teams to see their hardware at Goddard being prepared for launch later this year. I encourage everyone to take an hour or two out of their busy schedules to see what their fellow projects are doing right here on the Greenbelt campus. There's a lot to be proud of and much we can learn from.

We were notified of the New Frontiers finalist selections in December 2017. A total of 12 teams from around the country competed for the opportunity to be the next $1 billion planetary mission. Two of the 12 teams were

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selected for Phase A – Comet Astrobiology Exploration Sample Return (CAESAR) and Dragonfly. Both finalists have significant work content at Goddard. Additionally, two other Goddard teams, Enceladus Life Signatures and Habitability (ELSAH) and the Venus In situ Composition Investigations (VICI), were awarded technology-development funds to continue development in key areas for possible future mission opportunities. Quite an accomplishment for all four of our Goddard-involved teams!

I'd like to encourage all civil servants to participate in this year's Employee Viewpoint Survey (EVS) (for additional information, **see page 37**). The FPD community should be proud of our past EVS participation rates and overall scores. External organizations have taken a keen interest in how we are consistently rated as one of the best places to work in the federal government. Also, I'd like to remind everybody that the next annual survey will be out on May 10, 2018.

As most of you are aware, we are undertaking a major organizational transition of our resources community from the FPD to the Goddard Chief Financial Officer (CFO) organization (Code 150). Change can be disconcerting for sure but we are doing our best working with Code 150 to make it as seamless as possible. Steve Shinn, Goddard CFO, will be sharing information with the GSFC resources community in early May and later in the month, at an FPD All-Hands meeting. As always, if you have any questions of FPD leadership, please feel free to contact/meet with Wanda, Tom, or myself.

Lastly, regarding the Flight Projects Development Program (FPDP), I want to send out a warm welcome to our newly selected FPDP class (aka "Cohort #3"): Ben Hall, Joe Stevens, Cathy Stickland, and Jesse Walsh. The FPDP is a two-year program designed to accelerate learning and growth in flight project management. The program develops both technical and resource/business participants through the completion of relevant coursework, work assignments, varied development opportunities, comprehensive mentoring, and a Capstone project. Congratulations to our new cohort! And speaking of FPDP cohorts, Cohort #2, comprised of Mellani Edwards, Wen-Ting Hsieh, Obadiah Kegege, Vanessa Soto Mejias, and Brian Thomas is in the final stretch of the program. They are finishing up their Capstone project and looking forward to graduation this summer.

You may have noticed that I haven't been around as much as usual – I have been out of the office quite a bit for medical reasons but have been keeping in touch regularly, thanks to the terrific FPD team.  I look forward to returning full-time as soon as possible.

**David F. Mitchell**
Director, Flight Projects
david.f.mitchell@nasa.gov

# A WORD FROM THE DEPUTY

**In the second of a RECURRING SERIES of messages from the FPD deputies, TOM MCCARTHY, FPD Deputy Director, shares his thoughts on the GODDARD CODE OF CONDUCT and the ELEVATION of FPD.**


**"I am what I think. My character is the sum of my thoughts."**

**-Tom McCarthy**

# HIGH DEFINITION GOES WEST

## GOES-S joins its twin satellite in orbit to watch over the Western Hemisphere

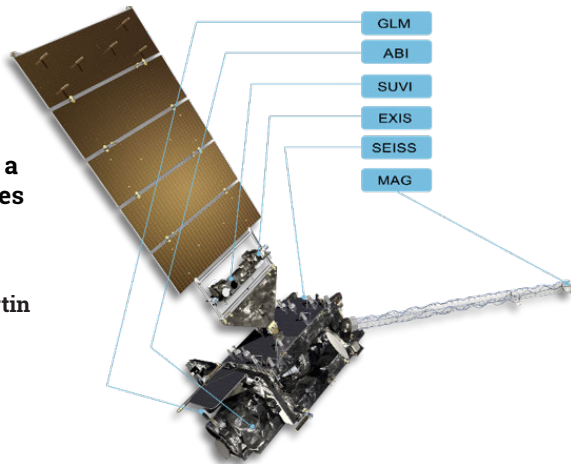
Liftoff of GOES-S on March 1, 2018. Credit: United Launch Alliance

The National Oceanic and Atmospheric Administration's (NOAA's) GOES-S (Geostationary Operational Environmental Satellite – S), the second in a series of four highly-advanced geostationary weather satellites, lifted off on March 1, 2018, at 5:02 p.m. EST from Cape Canaveral Air Force Station in Florida. The satellite was launched into space aboard a United Launch Alliance Atlas V rocket at the opening of the two-hour launch window. Upon reaching geostationary orbit 22,236 miles above the equator on March 12, GOES-S was renamed GOES-17. NOAA's GOES satellites are designated with a letter prior to launch and renamed with a number once they achieve geostationary orbit. GOES-17 will spend the next six months at 89.5 degrees west longitude undergoing checkout and validation of its instruments and systems. The satellite will move to its operational location at 137 degrees west in late 2018 and become NOAA's GOES West.

View more photos of the GOES-S launch at WWW.GOES-R.GOV/MULTIMEDIA/IMAGES/LAUNCHES.HTML. Watch video of the launch at GOES-R.NOAA.GOV/MULTIMEDIA/VIDEOS/LAUNCHES.HTML.

### A SOPHISTICATED SUITE OF INSTRUMENTS

Like its sister satellite, GOES-16, launched in 2016, GOES-17 hosts a suite of advanced instruments for monitoring weather and hazards on Earth and in space.




**Artist's rendering of a GOES-R Series spacecraft.**

**Credit: Lockheed Martin**

The **Advanced Baseline Imager (ABI)**, provides high-resolution imagery and atmospheric measurements in sixteen channels (two visible, four near-infrared and ten infrared) as frequently as every 30 seconds. New spectral information, increased resolution, and faster scanning ability, compared to the previous generation of GOES, allow for better discernment of meteorological features and improved forecasts.

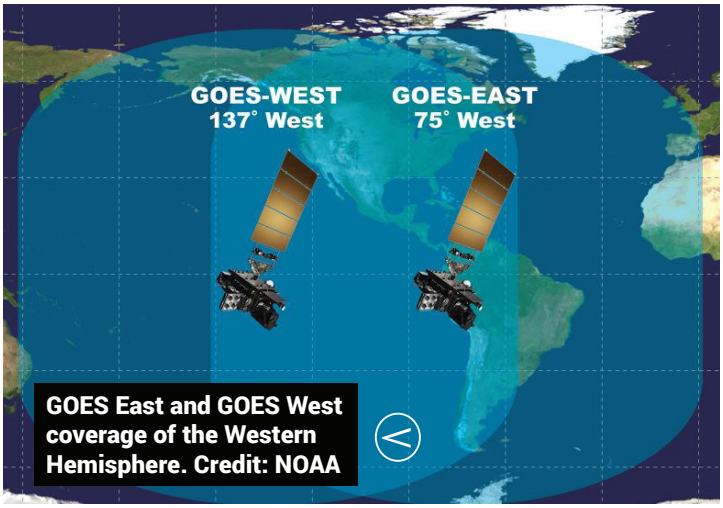
The **Geostationary Lightning Mapper (GLM)** is the first instrument of its kind flown in geostationary orbit. GLM collects information such as the frequency, location and extent of lightning discharges. The instrument measures total lightning, both in-cloud and cloud-to-ground, to aid in forecasting developing severe storms and a wide range of environmental hazards.

The **Solar Ultraviolet Imager (SUVI)** and Extreme Ultraviolet and X-ray Irradiance Sensors (EXIS) provide improved imaging of the sun and detection of solar eruptions for earlier warning of disruption to utility and communication and navigation systems.

The **Space Environment In-Situ Suite (SEISS)** and Magnetometer provide, respectively, more accurate monitoring of the energetic particles and magnetic field variations associated with space weather for better assessment of radiation hazards and mitigation of damage to orbiting satellites, communications, systems and power grids.

## A SECOND ADVANCED EYE IN THE SKY

GOES-17 will work in tandem with GOES-16, now at the GOES East position at 75.2 degrees west longitude. GOES-16 became operational in December 2017 and is already proving to be a game-changer for weather forecasting, providing a preview of what's to come with GOES-S. Together, GOES-16 and GOES-17 will observe the Western Hemisphere from the west coast of Africa all the way to New Zealand.



GOES East and GOES West coverage of the Western Hemisphere. Credit: NOAA

See how GOES East and GOES West work together to keep a vigilant eye on the Western Hemisphere in this animation: HTTPS://YOUTU.BE/2LOUKJZHFXM

## BOOSTING FORECAST ACCURACY IN THE WEST

GOES-17 will be ideally positioned to provide faster, more accurate data to track storm systems, lightning, wildfires, dense fog and other hazards that threaten the western United States, Hawaii, and Alaska. The satellite will significantly improve our view of the northeastern Pacific Ocean where many weather systems that affect the continental U.S. originate, and where there is currently sparse data. GOES-17 will also greatly improve GOES coverage of Alaska and high latitudes.

## TRACKING WILDFIRES

Wildfires are of particular concern in the western U.S. The increased resolution from the ABI, along with faster updates, help forecasters spot new fires much quicker than before and relay detailed information about growing fires to local agencies. During its checkout phase, GOES-16 allowed National Weather Service (NWS) forecasters to provide proactive, tactical wildfire decision support during

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a very active 2017 fire season. GOES-16 detected fires before they were spotted on the ground, often 10 to 15 minutes before emergency notifications to 911. ABI also has additional spectral channels not available on earlier GOES. Special fire temperature RGB (red-green-blue) imagery is used to detect hot spots. This imagery is created by using three of the instrument's shortwave and near-infrared bands. This imagery can be combined with a GeoColor enhancement to allow tracking of the rapid motions of both hot spots and smoke plumes.

**GOES-16 GeoColor and fire temperature RGB imagery of the wildfires raging in California on October 9, 2017. Credit: CIRA**

View an animation of this fire at HTTPS://YOUTU.BE/TSLS74CR_CU.

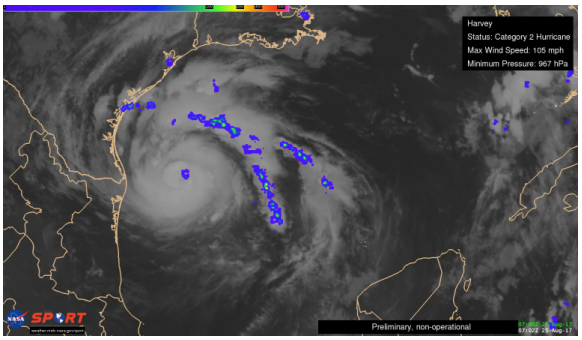
## IMPROVED TROPICAL CYCLONE TRACKING AND INTENSITY ESTIMATION

Like GOES-16, which provided revolutionary new data and imagery during the severe 2017 Atlantic hurricane season, GOES-17 will bring this same new technology to the Pacific Ocean. This means forecasters will have new high-resolution imagery of Pacific hurricanes that track toward Hawaii or Mexico during the summer and autumn. GOES-17 is equipped with an infrared channel that helps forecasters monitor cloud top temperatures, which are used to predict rainfall intensity and the potential for flash flooding or thunderstorms. GOES-17 also has three water vapor bands, two more than GOES-15, NOAA's current geostationary satellite over the Pacific. These additional channels will provide high resolution imagery of atmospheric water vapor, allowing forecasters to track the movement of major storms and pinpoint areas that will receive the heaviest precipitation. In August 2016, NWS forecasters tracked the eye of Hurricane Harvey using GOES-16 imagery in concert with radar data. They were able to alert emergency managers when they would have a window of opportunity to evacuate dozens of people to safety as the eye was passing over the region before the back end of the hurricane struck.

**GOES-16 GeoColor imagery of Hurricane Harvey on August 26, 2017. Credit: CIRA**

View one-minute imagery of the eye of Hurricane Harvey at HTTPS://YOUTU.BE/H0FZS2V5T_8 .

GOES-17 will also be able to collect one-minute imagery over tropical cyclones, which can help forecasters better locate a storm's center of circulation. In addition, the satellite's lightning mapper will provide forecasters with near real-time data on a storm's lightning activity, helping them identify the most convectively active portions of the storm.




**GOES-16 ABI and GLM imagery of Hurricane Harvey. Lightning is shown in blue in the eye and outer rainbands of Harvey. Credit: NASA SPoRT**

View GOES-16 lightning imagery of storms associated with Hurricane Irma at HTTPS://YOUTU.BE/NC6ODEI4URO.

## FOG DETECTION

**San Francisco Bay Bridge in fog.**

Coastal fog is a particular hazard in San Francisco and parts of the Pacific Northwest. Not only will GOES-17 provide high-resolution, real-time imagery of fog conditions, but the satellite's rapid scanning capabilities will also help forecasters predict when fog will clear. GOES-16 is demonstrating how new technology can help mitigate flight delays. In March 2017, data and imagery from GOES-16 helped air traffic controllers at San Francisco International Airport lift a ground delay due to fog. Forecasters were able to use the satellite's high-resolution imagery to predict when the fog would start to disperse, a decision that freed up 32 flights, prevented more than 20 hours of flight delays, and saved the airlines nearly $100,000. Fog monitoring from GOES-17 will also improve forecasts used by the maritime sector, such the fishing and commercial shipping industries.

Watch fog dissipate in the river valleys of New York and Pennsylvania in this GOES-16 GeoColor animation: HTTPS://YOUTU.BE/QRGOUSNLQT4.

## ATMOSPHERIC RIVER TRACKING

Atmospheric rivers can deliver enormous amounts of rain and high-elevation snow in California and the Pacific Northwest, especially during the winter months. These narrow conveyer belts of moisture transport large amounts of water vapor from the subtropics to the west coast of the continental U.S., often resulting in flooding and heavy snowfall. GOES-17 will provide rapid, high-resolution imagery of atmospheric rivers, improving forecasting of these events in advance of landfall along the coast.

## A GAME-CHANGER FOR ALASKA

GOES-17 will boost weather prediction all across the western U.S., but the new satellite will be especially valuable to Alaska. That's because NOAA's current geostationary satellites lack sufficient resolution in regions near the Arctic. GOES-17, however, will provide a significantly clearer view all the way to Alaska's North Slope and allow for applications such as tracking sea ice.

This vast new coverage will revolutionize forecasting in Alaska. For example, thanks to multispectral imagery created by combining multiple ABI bands, forecasters will be able to distinguish between clouds, snow-covered ground, and sea ice around Alaska's coasts. This will improve aviation and shipping forecasts, since current GOES visible satellite imagery can't easily differentiate clouds and snow – a particular challenge during Alaska's long, dark winter months.

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**Alaska's Pavlof Volcano erupting on March 16, 2016. Credit: Nahshon Almandmoss/U.S. Coast Guard**

GOES-17 will be able to detect hazards often experienced in Alaska, such as wildfires and volcanic ash. Volcanic ash is a significant health, aviation, infrastructure and economic hazard. New spectral channels, improved resolution and faster scanning from the ABI instrument allow for new products and better discernment of volcanic ash. This new information and imagery leads to improved air and ground safety. Air travel is extremely important in a state where flying is the only mode of transport in many remote areas. In addition, many of the North America-to-east Asia trans-Pacific flights pass over or near the Aleutian Islands.

Learn more about why GOES-17 is so important in the High Definition GOES West video at HTTPS://YOUTU.BE/XRJRFOSJRIA.

## A NOAA, NASA AND INDUSTRY PARTNERSHIP

The GOES-R Series Program is a collaborative development and acquisition effort between NOAA and NASA to develop, launch, and operate the satellites. NOAA funds and manages the program and is responsible for operating the satellites as well as the science and applications of the data. NASA oversees the development and testing of the GOES-R Series spacecraft, instruments, and launch vehicle. The integrated program office, located at NASA's Goddard Space Flight center, is staffed with personnel from NOAA and NASA and supported by industry contractors.

Lockheed Martin is responsible for the design, creation and testing of the satellites and the spacecraft launch processing. Lockheed Martin also built the GLM, SUVI and Magnetometer instruments. Harris Corporation provided the main instrument payload, the ABI, and the ground system, including the antenna system for data receipt. The Laboratory for Atmospheric and Space Physics built EXIS and Assurance Technology Corporation provided SEISS. United Launch Alliance is responsible for the launch vehicle and launch management is provided by NASA's Launch Services Program based at the agency's Kennedy Space Center.

The GOES-R Series is a four-satellite program (GOES-R, S, T and U) that will extend the availability of NOAA's operational GOES satellite system through 2036. GOES-T is scheduled for launch in 2020 and the launch of GOES-U is planned for 2024.

Learn more about the GOES-R Series at WWW.GOES-R.GOV.

MICHELLE SMITH / CODE 417
COMMUNICATIONS SPECIALIST

# GOLD LAUNCHES!

**The Global-scale Observations of the Limb and Disk (GOLD) mission launched on January 25, 2018 from French Guiana.**

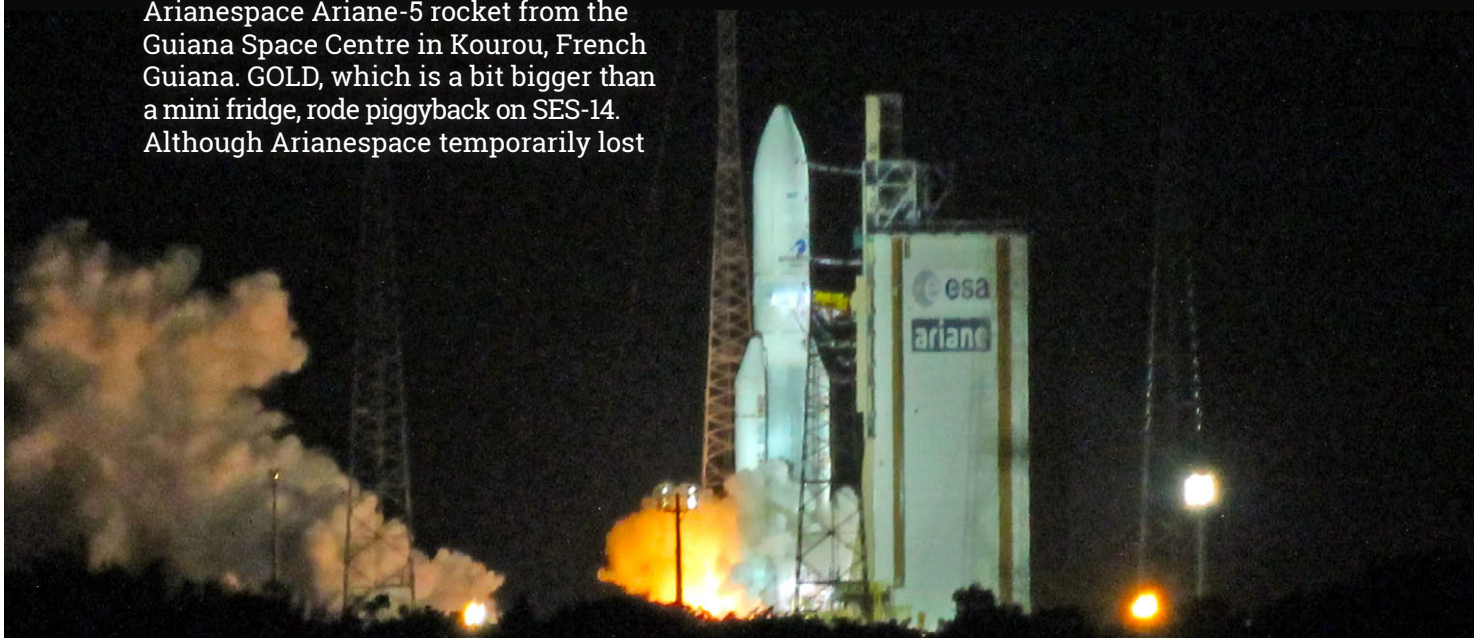
GOLD will study Earth's upper atmosphere, especially the temperatures in the ionosphere and thermosphere, from its perch in geostationary orbit, about 22,000 miles (35,400 kilometers) above the Earth. The instrument's observations should allow researchers to better understand this region and how it's affected by solar activity. GOLD is the first NASA science mission ever to fly as a "hosted payload" on a commercial satellite. The GOLD instrument and the SES-14 and Al Yah 3 communications satellites were launched on January 25, 2018 atop the Arianespace Ariane-5 rocket from the Guiana Space Centre in Kourou, French Guiana. GOLD, which is a bit bigger than a mini fridge, rode piggyback on SES-14. Although Arianespace temporarily lost contact with the rocket's upper stage about 9 minutes after launch, communication was restored and SES has successfully established a telemetry and telecommand connection to its SES-14 spacecraft and has set up a new orbit raising plan. The SES-14 and GOLD will reach geostationary orbit only about 4 weeks later than originally planned. SES confirms that the spacecraft is in good health, all subsystems on board are nominal, and the satellite is expected to meet the designed lifetime.

GOLD is the newest in NASA's fleet of heliophysics missions, which study a vast interconnected system—from the Sun to the space surrounding Earth and other planets, to the farthest limits of the Sun's constantly flowing stream of solar wind. GOLD will provide key information about how Earth's upper atmosphere is connected to this dynamic and complex system.

For more information on the GOLD mission, visit: HTTPS://WWW.NASA.GOV/CONTENT/GODDARD/GOLD

JOYCE KING / CODE 460
GOLD PROJECT MANAGER

SARAH JONES / CODE 674
GOLD MISSION SCIENTIST




CREDIT: UNIVERSITY CORPORATION FOR ATMOSPHERIC RESEARCH (UCAR)

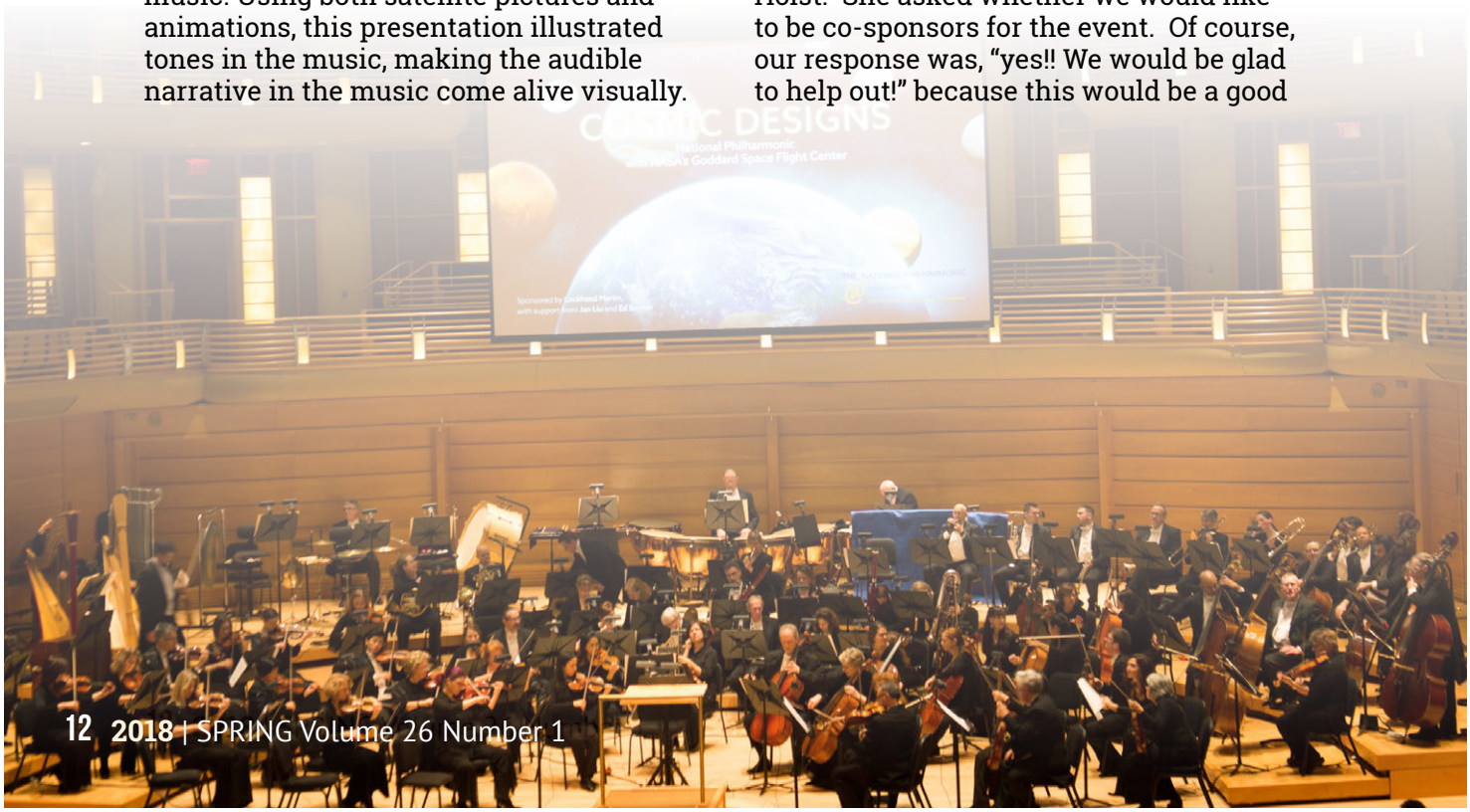
# COSMIC DESIGNS

**For Gustav Holst and Claude Debussy, the beauty of Earth and its surrounding planets inspired them not to collect data, but to compose music. One hundred years after the first performance of Holst's "The Planets," audiences had the chance to hear their music and see depictions of our awe-inspiring solar system simultaneously.**

On January 27 and 28, 2018, the National Philharmonic orchestra, in collaboration with Goddard Space Flight Center, presented Cosmic Designs at the Music Center at Strathmore in North Bethesda, MD. In this marriage of music and space imagery, the orchestra performed Claude Debussy's "La Mer" and Gustav Holst's "The Planets." Video producers at Goddard worked to collect depictions of our solar system's planets, as well as Earth's oceans, to accompany the music. Using both satellite pictures and animations, this presentation illustrated tones in the music, making the audible narrative in the music come alive visually.

Recent Goddard retiree, Jane Liu, was the catalyst for Goddard's involvement in this event and recently shared her experience with *The Critical Path*.

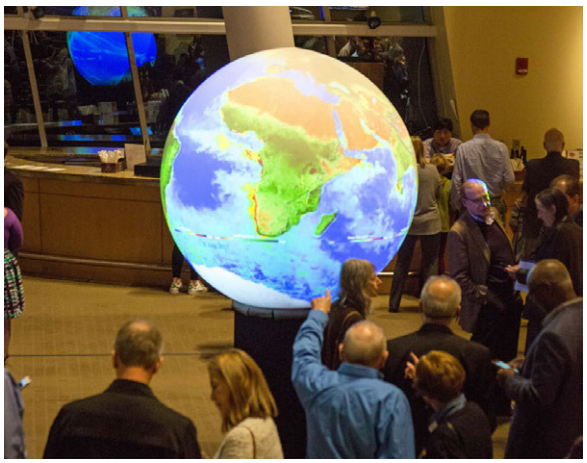
"My husband, Ed Brinker, and I are long-time supporters of the National Philharmonic Symphony (NPS). In September 2016, the President of the NPS, Leanne Ferfolia, approached us, requesting our help for the 2017-2018 season, particularly in planning a performance of "The Planets" by Gustav Holst. She asked whether we would like to be co-sponsors for the event. Of course, our response was, "yes!! We would be glad to help out!" because this would be a good



education and public outreach opportunity for GSFC, and a great way to get the younger generation interested in classical music.

"At that time, I sent an e-mail to Chris (Scolese), George (Morrow) and Nancy (Abell) of Code 100, to see if they would be interested in participating in the event and being co-sponsors for the event. Nancy responded back immediately and provided Michelle Jones from the Office of Communication as the point of contact to lead the planning, designing, and execution of the activities. Numerous telecoms to discuss different ideas, special speakers, and even a site visit with Leanne's group, made the event possible.

"As we got closer to the event on January 27 and 28, 2018, Michelle got Lora Bleacher of Code 690 involved. Lora took charge of coordinating the volunteers to cover the exhibit booths and the introduction of each planet by Geronimo Villanueva and Gina DiBraccio before the orchestra played the music. Rob Garner wrote the script. Michelle, with assistance from Deanna Trask, coordinated with the Office of Education for the Sphere Exhibit and chats with astronauts Paul Richards and Mary Kay Hire. They also coordinated with NASA Headquarters and recruited three video producers to create videos of the planets.



"During the concerts, the video was fantastic!!! Kudos to the video editors!! We were watching the video, and forgetting to listen to the orchestra performance. I enjoyed the introductions from Geronimo and Gina before each planet performance. Thanks to Rob for the script writing.

"It was a joy to see the kids visiting the exhibit booths, asking questions, and collecting souvenirs. They asked lots of great questions during the "Chat with Astronaut" sessions before both concerts.

"The Cosmic Designs performances were a great success!! For each day of the two performances, the NPS sold out all the seats, over 1,800 tickets (the capacity of the whole concert hall), and the audiences included

Chat with former astronaut Paul Richards

around 800 kids under 17 years old. We had over 60 people volunteering behind the scenes, who provided many hours of hard work to make the Cosmic Designs performances possible. Through great teamwork, this event was a great success!!" ▲

## AT THE INTERSECTION OF IMAGERY, MUSIC AND SPACE

On display during the concert was the Philharmonic's *Color the Music* exhibit. A marriage of art and music encouraged young artists aged 5 to 17 to create artwork depicting Holst's "The Planets" after listening to audio excerpts online, sparking creativity between the visual and performing arts. Montgomery County Public Schools participated. Swarupa Nune, a Goddard video producer for "The Planets," said she first had to listen carefully to the music and distinguish characteristics for each planet. Uranus, for example, is seen as an elusive planet, like a

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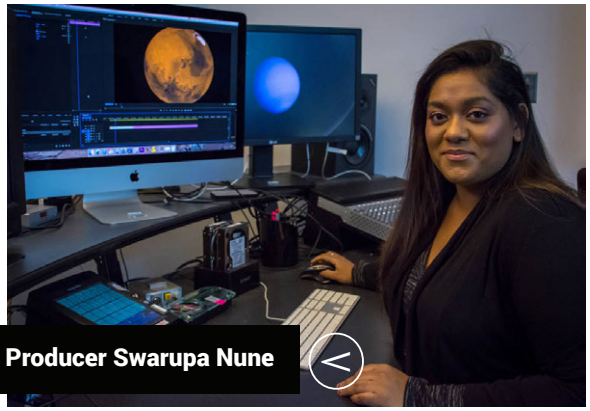
disappearing act; Holst even dubbed it "the magician." Mars, by contrast, is powerful and warlike. Each of the planets' perceived characters reveals itself in the music, which producers then translated into imagery.

After establishing the tones of each section, Nune worked closely with other producers to compile existing visuals and choose those that fit in the music. With help from data visualizers like Greg Shirah, Nune chose graphics to compose the video presentation. Shirah is a data visualizer who has worked



Producer Swarupa Nune

in Goddard's Scientific Visualization Studio for more than 20 years. He has worked on plenty of animation projects before, including the planetarium show "Dynamic Earth" and an animation of Earth's ocean currents called "Perpetual Ocean." He was able to reuse some of the same images for Cosmic Designs, taking advantage of animations such as snaking lines to show currents or winds.

NASA's producers did not include just animations to illustrate the music, they also tried to employ satellite photos as much as possible. This approach gives the audience a perspective of what they would see realistically, as if they were on a spacecraft looking down on the planet in question. Scott Sheppard, a Goddard summer intern, contributed several of the fly-by animations used in "The Planets." His contribution was important especially for Uranus and Neptune where source material is much more scarce. This project was different from the usual work of the producers at Goddard. In general, they are used to making shorter videos only a few minutes long. This production required a great deal of creativity and effort, and the producers are hoping to promote the revolutionary work taking place at Goddard.

Through this collaboration, the Goddard team endeavored to make the audience feel a sense of wonder at the images. This project was not only a junction of music and artistry, but it was also more broadly a union of art and science. By combining music with data-based representations, the science is accessible to everyone through a creative and engaging medium. The art and the science complement each other; and they form a striking bond. The concert demonstrated this ever-growing bond, and it will inspire others to get involved by learning more. ▲

ADAPTED FROM AN ON-LINE ARTICLE
BY ANA GONZALEZ / GSFC

INPUT FROM JANE LIU / GSFC RETIREE

Some of the key participants share their thoughts on *Cosmic Designs* :

**Wade Sisler** (GSFC / Executive Producer):
HTTPS://WWW.YOUTUBE.COM/WATCH?V=QT4LJT2NJ_C

**Swarupa Nune** (GSFC / Video Producer):
HTTPS://WWW.YOUTUBE.COM/WATCH?V=INBRKLMOF4K

**Piotr Gajewski** (NPS Music Director & Conductor):
HTTPS://WWW.YOUTUBE.COM/WATCH?V=OCPUYRXYAQO

# A SPACE-AGE DINOSAUR STORY

Asleep for 110 million years under sandy Maryland clay, a treasure trove of fossilized footprints lay beneath the grass of one of America's foremost space flight and exploration centers.

Since being unearthed in 2012 by an amateur paleontologist, a 7-foot slab of cretaceous red sandstone was discovered to contain more than 70 footprints by several types of dinosaurs, mammals, pterosaurs and maybe even a crocodilian. The discovery at NASA's Goddard Space Flight Center in Greenbelt, Maryland, revealed one of the highest track densities and diversities ever reported for the age of dinosaurs.

It also posed an interesting public relations puzzle for a team more accustomed to talking about the state-of-the-art Earth and space science.

"It was thrilling to work with Earth scientists and paleontologists on such an interesting discovery right on Goddard's campus," said Haley Reed, live shot coordinator with Goddard's Office of Communications since January. "I've always been interested in paleontology – so it was serendipitous that one of the first stories I had the chance to be a representative for Goddard was about a dinosaur fossil discovery."

The feature and video published on the morning of January 31, along with the science paper by Goddard Earth scientist Compton Tucker, footprint discoverer Ray Stanford, and partner researchers. The Washington Post, CBS Evening News, FOX 5, Science Magazine, Popular Mechanics, Newsweek, WJLA, WTOP, WBAL, VICE and others all either embedded Goddard's video, or relied heavily on Goddard footage and imagery to produce their own content.

Reed helped host news crews asking to shoot video of the replica in Building 33 over the course of a week after the release. Notable visitors included PBS NewsHour, CBS Evening News, WJZ – a CBS affiliate in Baltimore, Feature Story News – a news wire service, Fox News Sunday, Capitol News Service, and more.

The story of the discovery was also one of responding quickly to a fast-paced and rapidly-changing media landscape. That week also included Supermoon Live Shots the day before and the 60th anniversary of America's first steps in space; the Explorer 1 satellite launch was a priority 1, Agency-wide social media effort. In the midst of these activities, a visit by Congressman Steny Hoyer was modified to include a visit to the replica display.

The flurry of live activities that week masked years of advance work, including videography and high-resolution photography of the model, which gave detailed views for both research and publication of the find. Videographer Swarupa Nune shot video of Stanford and paleontologist Martin Lockley, of University of Colorado at Denver, discussing the slab of cretaceous red sandstone in Goddard's television studio. Due to numerous delays in publishing, much of this video work was completed far in advance of this year's publication.

The story strategy focused primarily on social media due to the competing events. Even with other big news coming out that week, THE FACEBOOK POST garnered more than double the average reach for stories in that time period – 98,403, with the video racking up 27,000 views. ON TWITTER, it saw 73,763 Impressions and 8,757 video views, while THE YOUTUBE VIDEO pulled in another 28,778 views.

KARL B. HILLE / CODE 130
OFFICE OF COMMUNICATIONS

## BEHIND THE BADGE

## GETTING TO KNOW THE FACES OF 400

# REBECCA LEVY

### BORN:

San Jose, California

### EDUCATION:

MGEM, Master in Global Entrepreneurship and Management, University of San Francisco, Fu Jen University in Taipei, IQS in Barcelona

B.S., Business Administration and Accounting, University of San Francisco

### LIFE BEFORE GODDARD:

Although born in California where she later returned for university, Rebecca considers herself a native Coloradoan. She spent most of her formative years in the Centennial State and her family still resides in Fort Collins, CO.

Before joining NASA in 2016, Rebecca held several international focused job roles/positions. Public service, volunteerism, and giving back to local and global communities are core elements that Rebecca strives to incorporate in both her personal and professional life. With a business background and an international MBA, Rebecca has gained diverse professional experience over the last several years.

Rebecca volunteered with the United States Peace Corps and served in the nation of Morocco for two and a half years. While in Morocco, Rebecca worked with several women's associations. In addition, she also provided support and guidance to a traditional dagger cooperative and other community members to improve their small business practices. She advised young women and girls as a mentor and helped facilitate three girls' empowerment camps. Rebecca also co-facilitated a science, technology, engineering, and math (STEM)-themed training program for 60 high school girls in the southern region of Morocco. She worked daily to foster healthy lifestyles, tutor high

**"I dressed up like Sally Ride in 3rd grade as a "dress like your hero day". She has always been a role model and I never would have predicted that I too would be able to contribute to NASA's storied history.**

**-Rebecca Levy**

## BEHIND THE BADGE

# REBECCA LEVY

school students, improve marketing and sales of local businesses, and to obtain a deep understanding of Moroccan culture, traditions, and customs.

To this day Rebecca still speaks Moroccan Arabic and Tamazight (the local language in that region of Morocco).

Rebecca also worked as the Manager of Global Partnerships at Youth Service America (YSA), a DC-based non-profit organization, before starting at NASA. She partnered with organizations both nationally and abroad to promote youth service and volunteerism. Her main project was coordinating a "Safer Roads, Safer India" grant program in partnership with Underwriters Laboratories (UL), Inc.

## LIFE AT GODDARD:

Rebecca joined NASA Goddard in July 2016 and has enjoyed every minute of it. She has come to appreciate learning about the many Goddard projects, programs, systems, and the diverse workforce. As a resources analyst she supports the JPSS Ground project management team and resources/financial team. Rebecca cites the core mission of NASA and its investment into employees as one of the main reasons she was ecstatic to accept her current position. She has been honored to participate in several of NASA's leadership and management trainings such as the Leadership Development & Excellence in Management (LDEM) program. In addition, Rebecca will be in the Foundations of Influence, Relationships, Success, and Teamwork (FIRST) 2018 cohort. Rebecca is currently a member of the New and Developing Professionals (NDP) Advisory Committee and the Code 400 Diversity and Inclusion Committee. She has worked at several career fairs providing advisement to interested applicants from the Peace Corps and AmeriCorps, respectively. NASA, as an "Employer of National Service," has the opportunity to employ AmeriCorps and Peace Corps alumni through this initiative sponsored by the Corporation of National and Community Service.


## LIFE OUTSIDE OF GODDARD:

Like most Coloradoans, Rebecca enjoys all outdoor activities. When not at work, you may find her camping, skiing, hiking, or running. Rebecca also enjoys volunteering in her community and currently works with the Ethiopian Community Development Council (ECDC) as a volunteer with resettled refugees in the DMV area. Leveraging her Arabic language skills, she is currently working with two Syrian families near Goddard, as a volunteer mentor. She is also a business mentor with Empowered Women International, which has a stated focus of helping women start their own small businesses. She also volunteers with Atlas Corps which is an exchange program for non-profit leaders from around the world doing a one-year fellowship in DC. She also enjoys yoga, practicing Arabic with friends, and eating healthy, locally sourced food. ▲

## BEHIND THE BADGE

## GETTING TO KNOW THE FACES OF 400

# BILL GLENN

Bill currently works as the Flight Projects Directorate (FPD) mission support manager, managing the assignment of Code 400 office and technical space and assisting with the resolution of conflicts of space use in the integration and testing facility with Code 500.

### BORN:

Annapolis, Maryland

### EDUCATION:

BS Architecture, University of Maryland, College Park

Master of Policy Sciences, University of Maryland, Baltimore

PhD, American Institute of Holistic Theology

### LIFE BEFORE GODDARD:

Bill's professional work years before Goddard were spent in the higher education, health care, and architecture and engineering sectors. For 17 out of 25 years, Bill worked for the State of Maryland Higher Education system at Towson University, the University of Maryland Baltimore County (UMBC), and Baltimore City Community College (BCCC). He last served at BCCC as Executive Director for Facilities and Operations. Between UMBC and BCCC, Bill was the senior facilities administrator and director of general services for a multi-clinic health maintenance organization (HMO).

In 2003, Bill interrupted his career to be a full-time caregiver to his mother. During this 5-year period Bill's interest in holistic health care found purpose. He enrolled in a distance learning program for holistic health and studying became his own therapy during that stressful but rewarding period.

**"My favorite quote is biblical; Be still and know that I am God.**

**-The Bible**

## BEHIND THE BADGE

# BILL GLENN

Bill's mother passed away after only 2 years, which coincided with a major health event for his successor at BCCC and Bill was asked to work part-time to fill in. Bill then resumed his studies, achieved his new degree, and became an independent practitioner at a wellness center. He was also a regular presenter in BCCC's Professional Development program.

Although he enjoyed his new vocation, holistic wellness personally meant being attuned to the universe's plan for him. He set a personal marker that would indicate the time to consider returning to his former career. The intention of the universe was made clear when he received a call from a headhunter within a day of reaching that marker. That call developed into the opportunity to come to Goddard.

## LIFE AT GODDARD:

Bill began his now 10-year stay at GSFC in 2008 as a contractor for the Facilities Management Division (FMD), Code 221 Planning Office. He was hired as directorate planner. It was the perfect niche to resume his career on a smaller scale of responsibility. As a directorate planner, he was assigned to Codes 400 and 700.

His first challenging assignment was to develop requirements, schematic design, budgetary estimate, and a funding submission package for the Flight Projects Building (Building 36). Having led efforts to plan and construct a 2-million-square-foot building before coming to Goddard, this was a lot of fun. He coordinated the development of architecture and engineering services from Parsons Infrastructure and Technology Group, Inc., and worked closely with Code 400 leadership on its vision for Building 36. He also prepared the exhaustive economic analysis required for the Agency's competitive construction of facilities funding process. In 2010, Bill was promoted to lead the planning/estimating workforce team in the planning office. This too was enjoyable because he has always enjoyed leadership and helping people fulfill their own goals.

In 2013, Bill was able to convert to a civil service position. Code 200 was added to his directorate planning assignment. Another year passed and he moved to FMD Operations and Maintenance, Code 227, as the contracting officer representative (COR) for the custodial and landscaping contract, Alternate COR for the facilities operations and maintenance services contract, building managers lead, and utility outage coordinator. After a challenging run there, he transitioned to the FMD Engineering unit, Code 224, as an architect. While in Code 224, Bill was part-time detailed to help Code 400 manage the space crunch caused by the Center physical space reductions. Finally, this paved the way to become Code 400's mission support manager. He was active in the Management Operations Division Diversity and Inclusion Committee representing Code 220.

In addition to his role of mission support manager, Bill also represents Code 400 as the voting member of the Facilities Review Committee and assists with directorate safety and Building 8 facilities operations manager (FOM) duties.

## LIFE OUTSIDE GODDARD:

Bill has no children but would be lost without a cat in his life. He thinks they are among God's greatest gifts to humans. His pastimes include gardening, landscaping, and interior design in his own homes (after having lived 44 years in his childhood home, Bill is currently buying his third home within 6 years). He loves to dine out with friends and family as often as possible. He has been very frugal in his life but he will spend money to feed a person without hesitation. But he doesn't particularly enjoy cooking. Bill likes to travel and he and his partner have visited more than 25 countries in the last 7 years. He maintains connections with the integrative health and wellness community by attending seminars and occasionally taking more classes. He is a certified Reiki and Chakra bodywork practitioner and at some point will likely re-engage providing holistic services. ▲

# BLACK HISTORY MONTH

## FEBRUARY 2018

*at Goddard Space Flight Center*

**The African American Advisory Committee (AAAC) and the Equal Opportunity Programs Office (EOPO) collaborated to host three events in honor of Black History Month in February 2018. The events held provided an opportunity for the Goddard Space Flight Center (GSFC) Greenbelt location, Wallops Flight Facility (WFF), and the Independent Verification and Validation (IV&V) facility sites to come together and celebrate the contributions of African Americans to our nation's history.**

The 2018 theme, "African Americans in Times of War," commemorated the centennial of the end of the First World War in 1918 and explored the complex meanings and implications of this international struggle and its aftermath, through our current campaigns in Afghanistan and Iraq.

(left to right): FPD panel participants Dave Mitchell (AAAC senior champion),, Andrew Mitchell, LaVida Cooper, Tony Cazeau, and Wanda Peters (all FPD) with Llauryn Iglehart and Margareth Bennett (EOPO, Code 120), and Tonjua Hines-Watts, Code 700.

We celebrated African Americans, past and present, who have given of themselves so we may enjoy our freedoms today, and reflected on the advances in space and science. Here at GSFC, this theme resonates with us greatly as we benefit from the talents many of our African American personnel bring to us as veterans. Their impact is evident in engineering, technology, science, communications, and administration.

The events held acknowledged the equal opportunity, diversity, and inclusion afforded to African Americans to pave the way for individuals to dream and reach their highest potential, no matter demographics, background, or life experiences. This is certainly the case when we reflect on our personnel here at GSFC and the veterans who continue to serve in various capacities around our Center. Through sacrifices and selfless dedication, African Americans have played a pivotal role in ensuring our space explorations.

The first event was a month-long collaboration between Goddard's National Society of Black Engineers (NSBE) Greenbelt Space Chapter and the GSFC EOPO to spotlight science, technology, engineering, and math (STEM) employees at Goddard. We recognized and celebrated the success of minority professionals in STEM careers and veterans of the U.S. Armed Forces here at GSFC. The initiative afforded STEM employees an opportunity to display placards with their name, school attended, code, and the name of the veteran they were honoring.

The second event, held on Thursday, February 22, 2018 at GSFC showcased Flight Projects Directorate (FPD / Code 400) project managers in a panel-style discussion. The AAAC, in conjunction with the EOPO and the FPD, hosted four African Americans, spotlighting their paths and trajectory to their current positions. The 60-minute moderated discussion panel allowed each to tell their story of how they became FPD project managers, including lessons learned and the commitment and responsibilities of the positions.

The third and final event, held at Wallops Flight Facility on Wednesday, February 28, 2018, featured a dynamic keynote speaker: Colonel Terrence A. Adams, USAF, Director of Communications and Chief Information Officer, Headquarters Air Mobility Command, Scott Air Force Base, Illinois.

> **"have courageous conversations, be curious, and have a caring heart.**
>
> **- Colonel Terrence A. Adams**

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Colonel Adams shared thoughts on this year's theme, "African Americans in Times of War," highlighting little-known stories and facts about African Americans in war and in support of war efforts. Colonel Adams' message conveyed the plight of African Americans and their contributions to our nation through military service. He closed out his presentation encouraging us all to "have courageous conversations, be curious, and have a caring heart."

Black History Month is an annual celebration recognizing the achievements of African Americans and the vital role blacks have played in U.S. history. Here at GSFC, we continue to recognize our diversity and join other federal agencies, the Department of Defense, and others in celebrating Black History Month. As we reflect on our principles of equal opportunity and inclusion, we recognize it is not enough to employ members; we have to provide opportunities. Mission success is contingent upon management leading by example, today, tomorrow, and well into the future. ▲

HENRY P. LANE / CODE 120
PROGRAM MANAGER (AAAC)
SPECIAL EMPHASIS PROGRAM MANAGER (SEPM) / EQUAL OPPORTUNITY PROGRAMS OFFICE (EOPO)

SHERLEY WILLIAMS / CODE 120
SPECIAL EMPHASIS PROGRAM MANAGER (SEPM) / EOPO (WFF)

# THE FUTURE OF MISSION SUPPORT AT NASA:

## Mission Support Future Architecture Program (MAP)


The Mission support future Architecture Program (MAP) is the next major initiative following on the optimization of processes from the Business Services Assessment (BSA). The MAP will transform mission support services from their current state to an enterprise operating model while maintaining mission focus, improving efficiency, ensuring local authority and valuing the workforce. The MAP will work with each mission support functional area to implement change in phases, across budget cycles to consolidate and streamline processes, reduce the risk of inconsistencies and redundancies, and share best practices. Where appropriate, mission support structures will be realigned, to include changes in budget authority and lines of reporting.

Phase 1 projects include the Office of Human Capital, the Office of Chief Financial Officer and the Office of Legislative Affairs. All have started their transformation plans and will begin implementation to include realigning budget and people beginning in fiscal year 2019 (October 2018 to September 2019).

Goddard hosted "The Future of Mission Support" roadshow on April 4, 2018 with members from the Mission Support Directorate (MSD). Employees had a chance to hear directly from the MSD leadership team and ask questions. ▲

Additional information regarding MAP can be found at: HTTPS://INSIDE.NASA.GOV/MSD/MAP

**GALE FLEMING / CODE 100.1**
**CHIEF OPERATIONS OFFICER**

# FLIGHT PROJECTS DIRECTORATE

## SENIOR LEADERSHIP ROUNDTABLE

The Flight Projects Directorate (FPD) Roundtable is comprised of senior leaders within FPD, engaging in strategic initiatives for the good of the organization, Center and Agency. This effort creates a shared leadership vision, providing a forum for identifying our competitive advantage as well as our institutional barriers, and for discussing what collaborative actions could be executed within 400's control. There is an intentional push by directorate leadership to keep the momentum going, which has already resulted in a change to the FPD Tag-Ups once a quarter to allow for the Roundtable to dedicate a half day to work strategic initiatives. The Roundtable meets monthly and has divided FPD priorities into four initiatives. We are sharing our Strategic Initiatives with the FPD community and each meeting will focus on a different element. In our latest meeting, we focused on "Our People" and planned initiatives are highlighted in green in the graphic below.

### Flight Projects Directorate (FPD)/Senior Leadership Strategic Initiatives

**Purpose of FPD Roundtable** - Enhance Goddard's program/project management, nurture our people, influence the external environment to sustain world class capabilities, and achieve mission success by cultivating a strategic and collaborative directorate.

The strategic competitive advantage of GSFC's FPD is multifaceted; enabling us to create an environment in which to accomplish our dynamic mission. Control of our resources enables us to be empowered to accomplish our mission. We strive to maintain and improve on being the premier program/project management organization at NASA which we accomplish through our **experience** and our **people**:

- We leverage and harness the experiences and passion of our people, to accomplish multiple missions and to collaborate for future work in a dynamic environment, enabling us to execute on a diversity of short/long term missions.
- We come to the game rooted in the experience base of our flight projects culture, with an agility and flexibility that serves our stakeholders and partners in the accomplishment of the mission.
- Our people get the job done in an environment of ever changing challenges.

Increase Recognition of 15+ Years of Service-Implemented

- Invite employees with 15 years or greater to be presented Length of Service Award by Director of 400 at Sr. Staff meeting to increase recognition. Employee's Supervisor will also be invited with an opportunity for a photo.

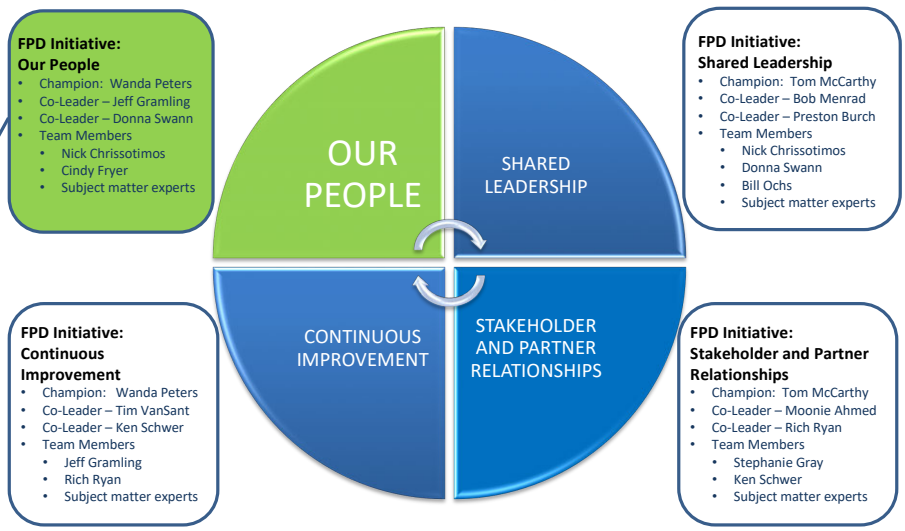
Increase Recognition of 5-10 Years of Service-Implemented

- 5-10 Year Service Award will now be sent to Supervisor and not Employee, to be presented in group setting.

FPDfest-In the Works

- Planning a Directorate-wide summer celebration to recognize awardees, including peer awards, as well as highlighting successes in new business, launches, GSFC and Agency Award winners! More information forthcoming!

**FPD Roundtable Team Updates**




**FPD Initiative: Our People**

- Champion: Wanda Peters
- Co-Leader – Jeff Gramling
- Co-Leader – Donna Swann
- Team Members
  - Nick Chrissotimos
  - Cindy Fryer
  - Subject matter experts

**FPD Initiative: Shared Leadership**

- Champion: Tom McCarthy
- Co-Leader – Bob Menrad
- Co-Leader – Preston Burch
- Team Members
  - Nick Chrissotimos
  - Donna Swann
  - Bill Ochs
  - Subject matter experts

**FPD Initiative: Continuous Improvement**

- Champion: Wanda Peters
- Co-Leader – Tim VanSant
- Co-Leader – Ken Schwer
- Team Members
  - Jeff Gramling
  - Rich Ryan
  - Subject matter experts

**FPD Initiative: Stakeholder and Partner Relationships**

- Champion: Tom McCarthy
- Co-Leader – Moonie Ahmed
- Co-Leader – Rich Ryan
- Team Members
  - Stephanie Gray
  - Ken Schwer
  - Subject matter experts

WANDA PETERS/ CODE 400
FPD DEPUTY DIRECTOR FOR PLANNING AND BUSINESS MANAGEMENT

# OUT & ABOUT

## LIFE'S HIGHLIGHTS OFF CAMPUS

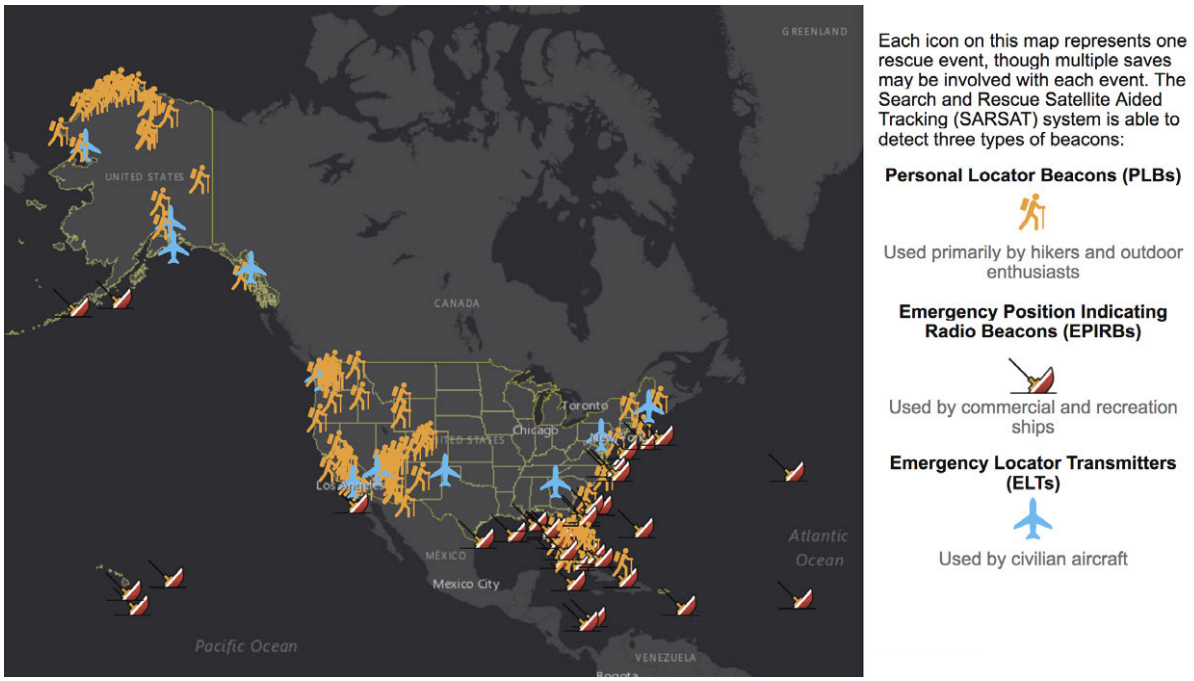
**Bill Chambers (Sierra Lobo / Code 549) supports the JWST project and many other flight projects as they come through environmental testing at GSFC. In February, Bill won the Northeastern Maryland Technology Council (NMTC) Visionary Award for Mentoring. Bill received the award from Mike Parker, NMTC Chairperson and industry consultant.**

**Dave Mitchell (400), Jeff Gramling (420), Nick Chrissotimos (460), and Tom McCarthy (400) presented Karen Halterman (421) with her retirement certificate and Thirty-Year Service Award. Karen is an accomplished veteran Goddard project manager, retiring as Polar Orbiting Environmental Satellite (POES)/Meteorological Operational Satellite (MetOp) project manager. Prior to her current assignment, Karen served as project manager of the Magnetospheric Multiscale Mission (MMS) through the Critical Design Review, and before that as POES project manager.**

**Laura Milam-Hannin recently retired as an FPD Associate Director and Chief of the Project Formulation and Development Office, Code 401. Laura worked at GSFC for nearly 35 years, and enjoyed a diverse career as an aerospace engineer supporting a wide variety of in-house and out-of-house projects. She served as instrument manager on multiple missions before being assigned to leadership positions within the Electrical Systems Branch and Mechanical Systems Division. In 2013, she helped implement the Instruments Projects Division, Code 490, as a Deputy Division Manager. Laura is a graduate of the Code 400 PMDE Program as well as the Federal Executive Institute.**

# THE LATEST SAR SAVES

## NASA'S SEARCH AND RESCUE (SAR) OFFICE CONTINUES ITS EFFORTS TO DEVELOP AND IMPROVE ON LIFE-SAVING DISTRESS BEACON TECHNOLOGIES.




Each icon on this map represents one rescue event, though multiple saves may be involved with each event. The Search and Rescue Satellite Aided Tracking (SARSAT) system is able to detect three types of beacons:

**Personal Locator Beacons (PLBs)**

Used primarily by hikers and outdoor enthusiasts

**Emergency Position Indicating Radio Beacons (EPIRBs)**

Used by commercial and recreation ships

**Emergency Locator Transmitters (ELTs)**

Used by civilian aircraft

COSPAS-SARSAT rescues from April 2017 through April 2018 are shown above.

# DID YOU KNOW...?

### March 20 was Nowruz, or the Persian New Year?

The new year begins during the equinox every year and is celebrated by millions. The holiday is observed by doing a deep cleaning of homes (ridding of clutter to start fresh) and wishing good luck in the year ahead. A collection of items called a "haft-seen" symbolizes a different hope for the coming year.

**We want to be in the know! If you have something to share, please send it to Code 400 Diversity and Inclusion Committee, c/o Matthew Ritsko at: matthew.w.ritsko@nasa.gov and we'll include it in a future issue of the Critical Path.**

Haft Seen in Nishapur
Credit: Public Domain

# October 1 2017 through March 31, 2018

## COMINGS

**CHRISTOPHER J. ROBERTS** (GSFC-5810) to 450.2/Technology Enterprise and Mission Pathfinder Office (TEMPO), mission manager for innovative applications

**CAROL A. FESTER** (GSFC-1560) detail to 4501/Networks Integration Management Office (NIMO) financial management specialist

**RICHARD A. CARTER** (GSFC-2240) to 420/Earth Science Projects Division (ESPD), assistant program manager

**CULLEN NICE** to 405/Resource Analysis Office (RAO), operations research analyst

**PETER W. ONDRUS** (GSFC-2010) to 490/Instrument Projects Division (IPD), Resolve instrument project, senior resources analyst

**WILLIAM L. GLENN** (GSFC-2240) to 400/Flight Projects Directorate (FPD), mission support manager

**CECILIA ALLEN CZARNECKI** (GSFC-4000) – Rehired Annuitant "Consultant" to the 400/Flight Projects Directorate

## GOINGS

**NICOLE D. TURNER** (GSFC-4010) - Detail to NASA Headquarters' Office of Education, Chief Executive Officer

**RONALD J. ZALESKI** (GSFC-4520) - Retired from 452/Space Network project, AST-Aerospace Flight Systems

**JASON M. BALDESSARI** (GSFC-4440) to 603/Sciences and Exploration Directorate, Administration & Resources Management Office, senior resources analyst

**RICHARD J. LYNCH** (GSFC-4830) - Resigned from 483/Restore-L Project, Robotics Servicing Vehicle (RSV) manager

**KAREN N. HALTERMAN** (GSFC-4210) – Retired from 421/Polar Orbiting Environmental Satellite (POES), project manager

**KATHY R. HARTMAN** (GSFC-4010) - Retired from 401/Advanced Concepts & Formulation Office, study manager

**CECILIA ALLEN CZARNECKI** (GSFC-4000) – retired from400/Flight Projects Directorate, assistant director

**DEBORAH L. HINKLE** (GSFC-4720) – retired from 472/Joint Polar Satellite System (JPSS) Flight project, financial management specialist

**JANE L. LIU** (GSFC-4540) – retired from 454/Tracking & Data Relay Satellite (TDRS) project, financial management specialist

**MARIE D. RAWLINGS** (GSFC-4520) – retired from 452/Space Network project, project support specialist

**PAUL W. RICHARDS** (GSFC-4510) – detail to HQs/HEOMD, Space Communications & Navigation Division

**VANESSA HERNANDEZ** (GSFC-4610) – resigned from 460/Explorers & Heliophysics Projects Division (EHPD), senior resources

**LAURA J. MILAM-HANNIN** (GSFC-4010) – retired from 401/Project Formulation & Development Office (PFDO), associate director for formulation

**JAMES E. CLAPSADLE** (GSFC-4580) - reassignment to 584/AST-Mission Support Requirements and Development

**ROGER N. CLASON** (GSFC-4500) - reassignment to 700/Information Technology and Communications Directorate, deputy chief information officerLand Imager 2 (OLI-2)

**PHILIP J. BALDWIN** (GSFC-4502) – transferred to NASA Headquarters, Human Exploration and Operations Mission Directorate

**KARILYS MONTANEZ** (GSFC-4600) - transferred to NASA Headquarters, program analyst

**BENJAMIN B. REED** (GSFC-4800) - detail to Executive Office of the President (EOP), Office of Science & Technology Policy (OSTP), National Space Council Senior Policy Advisor

## REASSIGNMENTS, REALIGNMENTS & DETAILS WITHIN CODE 400

**KEVIN N. MILLER** (GSFC-4800) to 401/Proposal Formulation and Development Office (PFDO), deputy program business manager

**JAVIER LECHA** (GSFC-4540) to 450.3/Search and Rescue (SAR) Mission Office, deputy mission manager

**GARRY L. GAUKLER** (GSFC-4200) to 480/Satellite Servicing Projects Division (SSPD), deputy project manager-resources

**KENNETH M. LEE** (GSFC-4600) to 460/EHPD, financial management specialist

**PAMELA HARRIS** (GSFC-4430) to 474/JPSS Ground Project, financial management specialist

**PAMELA S. MILLAR** (GSFC-4070) to 407/associate director for the Earth Science Technology Office (ESTO)

**CAGATAY AYMERGEN** (GSFC-4720) to 472/JPSS Flight project, instrument manager

**JEFFREY D. HEIN** (GSFC-4720) to 472/JPSS Flight project, instrument manager

**NYLSEVALIS ORTIZ COLLAZO** (GSFC-4170) to 410/Geostationary Operational Environmental Satellite (GOES)-R series program office, deputy program business manager

**BRENT P. ROBERTSON** (GSFC-4010) to 483/Restore-L, project manager

**SHERRIE L. WOOD** (GSFC-4501) to 460/EHPD, financial management specialist

**JOAN E. BENNETT** (GSFC-4410) to 490/IPD, Global Ecosystem Dynamics Investigation—Light Detector and Ranging System (GEDI-LIDAR) instrument project, senior resources analyst

**JONATHAN JAMES CARPENTER** (GSFC-4900) to 490/IPD, Ocean Color Instrument (OCI) instrument project, senior resources analyst

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# REASSIGNMENTS, REALIGNMENTS & DETAILS WITHIN CODE 400

**LAUREN ADAMS** (GSFC-4900) to 490/IPD, Thermal Infrared Sensor (TIRS) II instrument project, senior resources analyst

**KEITH D. WALYUS** (GSFC-4960) to 490/IPD, deputy instrument project manager

**SHARON A. STRAKA** (GSFC-4200) to 400/Flight Projects Directorate, special assistant to the Director of Flight Projects

**RYAN HANCOCK** (GSFC-4700) to 472/JPSS Flight project, senior resources analyst

**EUGENE D. GUERRERO-MARTIN** (GSFC-4210) to 421/POES, project manager

**BARBARA J. HASKELL** (GSFC-4030) to 403/Flight Projects Directorate, Business Management Office, supervisory-resources management officer

**SACHIDANANDA R. BABU** (GSFC-4070) to 407/ESTO technology program manager

**ROBERT C. SMITH** (GSFC-4830) to 407/ESTO, technology development manager

**RONALD J. HOOKER** (GSFC-4210) to 421/POES deputy project manager

**CHRISTOPHER M. GRAU** (GSFC-4600) to 450/Exploration & Space Communications Projects Division, deputy program business manager

**JULI A. LANDER** (GSFC-4430) - detail to 451/Laser Communications Relay Demonstration (LCRD) project, deputy project manager

**MATTHEW J. STRUBE** (GSFC-4830) to 480/Satellite Servicing Projects Division, payload systems manager

**JAHI O. WARTTS** (GSFC-4900) to 420/Earth Science Projects Division, program business manager

**MICHAEL D. HILL** (GSFC-4970) to 490/IPD, deputy instrument project manager

**EDWIN V. GRIEGO** (GSFC-4200) to 458/Space Network Ground Segment Sustainment (SGSS) project, Ground Segment Sustainment manager

# REORGANIZATIONS WITHIN CODE 400

**RENAMED** 401/Advanced Concepts & Formulation Office (ACFO) to Project Formulation & Development Office (PFDO)

**RENAME** 456/Space Network Expansion (SNE) to Laser-Enhanced Mission Navigation and Operations Services (LEMNOS) Project (pending)

**RENAME** 401.2/Project Management Excellence & Innovation Office to National Oceanic and Atmospheric Administration (NOAA) Pre-Formulation Office (pending)

LISA HOFFMANN, CODE 400
ADMINISTRATIVE OFFICER

# WHAT'S UP WITH THE FLIGHT PROJECTS DEVELOPMENT PROGRAM COHORT #3?

**The Flight Projects Development Program (FPDP) is a rigorous, two-year program designed to develop highly skilled flight project management personnel through an accelerated learning and development curriculum. Participants attend required and elective coursework, complete two specially selected work assignments, attend various developmental opportunities, receive comprehensive mentoring, and develop a Capstone Project.**

Please welcome the following individuals to the Flight Projects Development Program Cohort #3 effective April 29, 2018:

Benjamin Hall / Code 423

Edwin "Joe" Stevens / Code 474

Cathy Stickland / Code 425

Jesse Walsh / Code 221

Ben, Joe, Cathy and Jesse will be very busy over the next two years and will interface with many of you throughout the course of the program. Please extend a warm welcome and best wishes for success in FPDP, and for their future careers in the Flight Projects Directorate.

FPDP Cohort #2 is busy working on their Capstone Project, and will present their work and recommendations to the FPDP Governance Board on May 24, 2018. Mellani, Wen-Ting, Obadiah, Vanessa and Brian are eagerly anticipating graduation from the FPDP in June. More to follow on Cohort #2 in the next edition of The Critical Path.

**FPDP Cohort #2 participants attended a workshop held at Marshall Space Flight Center, March 20-21, 2018.**

**(front: Brian Thomas; back (left to right): Walt Faulconer, Obadiah Kegege, Wen-Ting Hsieh, Vanessa Soto, Mellani Edwards, Donna Swann)**

For more information about the FPDP, please look for an overview on the hub, or contact Donna Swann at **Donna.J.Swann@nasa.gov**.

DONNA SWANN / CODE 400
FPD ASSISTANT DIRECTOR
COHORT #3 MANAGER

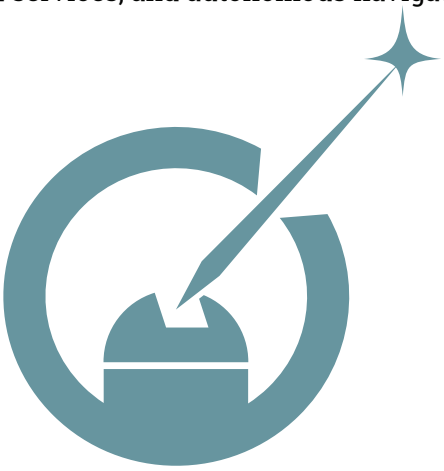
CECILIA ALLEN CZARNECKI / CODE 400
FPD ASSISTANT DIRECTOR
COHORT #2 MANAGER


**NASA's vision for future space communications architecture relies on the union of numerous innovations into what many at NASA call the Space MobileNetwork, an interplanetary internet.**

For users, the space communications architecture of tomorrow somewhat resembles the Earth-based communications of today. Just as we can pick up the phone and speak with friends on another continent, NASA missions at other planets will easily connect with operations centers many millions of miles away.

For network engineers, however, the Space Mobile Network doesn't resemble any network previously assembled. It's a robust network that provides quality services over great expanses with the agility of modern cell phone networks. NASA must bridge these vast distances through bold, persistent innovation.

The Space Mobile Network depends on many technologies developed by communications engineers across the Agency. At NASA Goddard Space Flight Center, research focuses on four major innovations: laser communications, disruption tolerant networking, user-initiated services, and autonomous navigation.



## LASER COMMUNICATIONS

Traditional networks rely on the Laser communications may have the most public visibility of Space Mobile Network enabling technologies, ironic given that it takes place in infrared, just out of human view. Using this portion of the electromagnetic spectrum will allow missions to communicate outside of those segments of the spectrum currently used for space communications, already awash in users.

Additionally, when compared to traditional radio communications, laser offers improved data rates by many orders of magnitude. The Lunar Laser Communications Demonstration, a 2013 mission, transmitted over six times as much data per second from the Moon compared to previous state-of-the-art radio systems.

Laser communications also provide missions a system of reduced size, weight and power requirements. A smaller size leaves more room for science instruments, a weight reduction can mean a less expensive launch and reduced power allow batteries to last longer.

## DISRUPTION TOLERANT NETWORKING

Traditional networks rely on the uninterrupted flow of data from user to user even if the data must flow through multiple intermediaries. If circumstance interrupts any leg of the journey, missions lose data. Disruption tolerant networking (DTN) alleviates this issue.

With DTN, data is stored at any point along the route that does not immediately have a connection to the next intermediary. DTN protocols allow the data to rest at DTN nodes until the path forward is unobstructed.

Think of the postal service. Along a letter's route from sender to recipient, the letter makes numerous stops. At each stop, the postal service stores the letter until it can proceed onto the next leg of the journey. DTN operates similarly.

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## USER-INITIATED SERVICES

Typically, missions must schedule communications services two weeks or more in advance. This limits a mission's ability to respond to unplanned science events.

User-initiated services (UIS) would enable automated service access requests at a moment's notice. Continuous low-rate links would allow a mission to alert the network of its data needs. The system would allocate service based on available resources, existing schedules, and mission priorities without human intervention, providing responsive communications services, reducing operating costs and increasing efficiency.

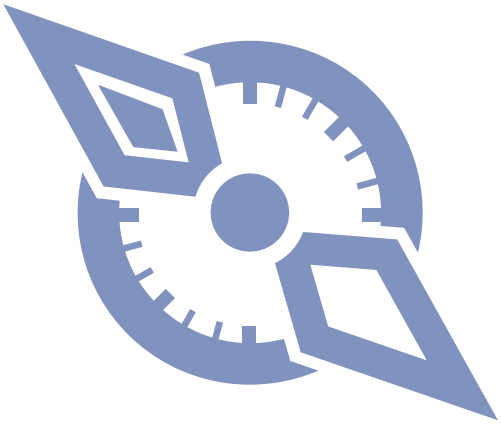
In essence, UIS would allow space communications to adapt to changing mission needs. Say a mission studies long-term solar activity. Their data collection needs may change with the sudden eruption of a solar flare. UIS could respond to this unforeseen spike, providing timely mission data to heliophysicists on the ground. With UIS, limited onboard autonomy and storage would no longer limit data collection in circumstances like these.

## AUTONOMOUS NAVIGATION

NASA hopes to move from ground-based navigation to navigation calculated in real time by spacecraft. Innovations in GPS and timing technologies are two of the many ways that NASA advances autonomous navigation.

Many satellites in low-Earth orbit rely on GPS satellites to determine their position. NASA-developed technologies could one day extend GPS usage to as far away as lunar orbit. In fact, NASA has already launched missions that can utilize GPS nearly 100,000 miles from Earth.

In deep space, onboard atomic clocks could provide spacecraft the timing data needed to calculate their location and make navigation decisions without waiting for guidance from Earth. Atomic clocks have been, until recently, prohibitively large for practical use. NASA engineers are working on miniaturized atomic clocks that would enable autonomous navigation by allowing spacecraft to calculate their position and trajectory onboard.



Each of these innovative technologies has a home in Goddard's Exploration and Space Communications (ESC) projects division. In fact, Goddard serves as a proving ground for many Space Mobile Network technologies.

A recent demonstration of DTN sent a selfie from Antarctica to the space station, making stops at numerous DTN nodes along the way. Technology demonstrations like this help to demonstrate DTN's ability to connect the unconnected and inspire future missions to incorporate the technology.


**Posing at McMurdo Station, Antarctica**

The Laser Communications Relay Demonstration (LCRD), launching in 2019, will test foundational laser communications technologies. It will relay data between optical ground stations through a geosynchronous satellite.

Another upcoming mission, the Integrated LCRD Low-Earth Orbit User Modem and Amplifier Terminal (ILLUMA-T), will relay communications from the space station through LCRD to those same ground stations. ESC is even developing a laser communications terminal for use by astronauts aboard the Orion Multi-Purpose Crew Vehicle, dubbed Optical to Orion (O2O).

The Space Mobile Network User Demonstration Satellite (SUDS,) a CubeSat developed cooperatively with the U.S. Naval Academy, will test and improve UIS software. SUDS will use a direct-to-Earth connection through the Near Earth Network to demonstrate UIS and other Space Mobile Network concepts at a low cost to NASA.

ESC's contributions to autonomous navigation focus primarily on policy. NASA is working to ensure that international constellations of Global Navigation Satellite System satellites can support missions beyond low-Earth orbit. Our engineers are also studying the upper limits of GPS support and usability, looking at GPS signal visibility near the Moon.

The ESC receives programmatic oversight from NASA's Space Communications and Navigation program office at NASA Headquarters in Washington, D.C. The communications engineers and architects here at Goddard Space Flight Center work diligently to develop innovative technologies and infuse them into NASA missions and the commercial market. ▲

For more information about the communications innovations pursued at Goddard, visit **ESC.GSFC.NASA.GOV.**

DANNY BAIRD / CODE 450
TECHNICAL WRITER

# BEGOÑA VILA COSTAS RECEIVES MARIA JOSEFA AWARD

**ON DECEMBER 27, 2017, BEGOÑA VILA RECEIVED A PRESTIGIOUS AWARD FROM HER HOME REGION OF GALICIA, SPAIN.**

The award, named for María Josefa Wonenburger Planells, a famed Galician mathematician and the first Spaniard to receive a Fulbright scholarship for doctoral studies in mathematics, honors one woman a year who has contributed to and inspired other women in the fields of science, engineering, and technology.

Begoña (full name Maria Begoña Vila Costas) currently works on the James Webb Space Telescope (JWST) project as the instrument systems engineer for the Fine Guidance Sensor/Near Infrared Imager and Slitless Spectrograph (FGS/NIRISS) instrument, a contribution from Canada. Begoña is also an operations lead for the JWST Integrated Science Instrument Module (ISIM). She obtained a PhD in Astrophysics from the Jodrell Bank Centre for Astrophysics at the University of Manchester in the UK, after obtaining her undergraduate degree in Spain. Prior to coming to Goddard, she was the lead systems engineer on the FGS/NIRISS at the development organization, COM DEV, in Canada where she and her family lived for 18 years. Since she did such an exceptional job there, she was hired by JWST to work directly with the project at Goddard.

> **"I hadn't heard about the award until they called, so I contacted my sisters and asked them what they thought of it. They directed me to the website and I realized this was quite an honor – we were all very excited.**

For about 2 years prior to receiving the award, Begoña was becoming more well-known in Spain and particularly in her home town of Vigo. She was getting increasing numbers of requests for interviews: for radio, newspaper articles, and for personal appearances on TV shows. While these requests were mostly in Spain, they also included Spanish media in the US as well as other US media, including an interview on National Public Radio. Most of her interviews were either about supporting and inspiring women in the science, engineering and technology fields, or specifically about the development and expected benefits of the James Webb Space Telescope.

"Since the number of requests was increasing, my sisters in Vigo were helping me to research the organizations and tell me which ones I should respond to. It was becoming quite a fun family affair!" Begoña said. So when she got the notification of the María Josefa award, she wasn't sure what it all meant.


Begoña standing in front of a panel describing her award. Credit: Becky Lambros

"I hadn't heard about the award until they called, so I contacted my sisters and asked them what they thought of it. They directed me to the website and I realized this was quite an honor – we were all very excited."

Xunta de Galicia is one of 17 regions of Spain (the one in the news lately was Cataluña where Barcelona is located and recently made a failed attempt to secede). Like all the other regions, Galicia has its own local

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government including a President and Vice President and its own language (Gallego). After meeting the Vice President a few days before the award ceremony and being treated to lunch, the award was presented to her by the President, Alberto Núñez Feijóo. The ceremony was replete with other dignitaries, the media, and professional photographers.

"It was a very special day and so nice that I could bring my parents, my kids, and many of my other family and friends, about 30 of them, to be part of the celebration," Begoña beamed.

Part of the ceremony included an introduction of the winner by a 'laudatio' – a person familiar with the award recipient and her work. Begoña said, "It meant a lot to me that Scott Lambros, JWST instrument manager, agreed to do this – he has worked with me for many years and he is also a good friend. He rose to the occasion by giving his speech in Spanish, even though he does not speak that language. My brother and sisters helped him with the translation and pronunciation and I had no idea what he was going to say until the event. He was very proud that the President of Galicia said he spoke in perfect Spanish! Scott and his wife also got to enjoy a short holiday in Galicia."

The award ceremony took place in the city of Santiago de Compostela, the traditional end of the Camino de Santiago pilgrimage route. It is a beautiful town and the ceremony was directly across from the Cathedral, a very scenic place to be.

Begoña made a vacation out of this trip, taking about 2 weeks over Christmas to spend with her extended family at her parents' house in Vigo. Of course she still called in to telecons for work during that time. And of course she also did radio and newspaper interviews while there, including giving a talk at her old high school, where they were honored to have the award recipient come back to her alma mater. ▲

Scott Lambros giving his speech in Spanish!
Credit: Becky Lambros


Begoña receives the María Josefa award from President Alberto Núñez Feijóo
Credit: Becky Lambros

SCOTT LAMBROS / CODE 443
JWST INSTRUMENT MANAGER


NASA has been named the Best Place to Work in government, in the large agency category, for the 6th year in a row!!!!!

**AGENCY REPORT**

National Aeronautics and Space Administration

*Best Places to Work Rank out of 18 Large Agencies*

2017 Index Score **80.9** | **1** | Change from 2016 **2.3**

**2012, 2013, 2014, 2015, 2016, & 2017!**

**AGENCY REPORT**

Goddard Space Flight Center (NASA)

*Best Places to Work Rank out of 339 Agency Subcomponents*

AND GSFC ranked #1 | **8** | of all NASA centers

**FOR THE 2ND CONSECUTIVE YEAR!**

Goddard SPACE FLIGHT CENTER

**CODE 400**

Goddard Space Flight Center (NASA)

*Increased overall average score in 2017*

to **83.7%** | IN 2016 | up from **83.4%**

Thank you for taking the time to complete the survey!

Please visit http://www.bestplacestowork.org for a complete listing of rankings and scores.
Please visit http://bestplacestowork.org/BPTW/rankings/detail/NN51 to view specific results for Goddard.

# FPD OPERATIONS HUB

The FPD Ops Hub has been redesigned. Five main categories describing FPD operations include: About Us (includes the organization chart and contacts, awards information, plus D&I and employee development information); Communications (including The Critical Path and FPD Messenger, meeting minutes, all-hands and forum information, knowledge management, and e-mail listserves); Reporting/Analysis (includes weekly and monthly reports, document guidance and examples, as well as mission and launch information); Resources Management (includes programmatic toolkits and key documents); and Tools (with links to essential GSFC and FPD database tools).



We hope you will find this updated site easier to navigate and filled with useful information. CHECK IT OUT!

# STUDENTS CONTACT THE ISS

Over the past few months, NASA has been working closely with South River High School and Anne Arundel County leadership to create STEM Engagement events for students. To participate in the culmination activity, an opportunity to talk to the current astronaut crew of the International Space Station (ISS) via ISS Downlink, students were required to attend six events. Goddard's 'Women of Flight' came out to engage with students in a 'Women in STEM' networking session on April 19, 2018. Students were separated into small groups that speed-networked with each woman for 15 minutes. The ISS Downlink event was a huge success and over 700 students successfully accomplished all the requirements to attend. Astronaut Ricky Arnold, a native of Bowie, Maryland, thrilled students by showing off his South River High School tee-shirt, worn under his astronaut jumpsuit, which had the Maryland flag emblazoned on the front. The students were very engaged and it was evident they had a good understanding of the operations of NASA and the ISS, and the work of the Satellite Servicing Projects Division (SSPD), Transiting Exoplanet Survey Satellite (TESS), and Space Communications and Navigation (SCaN) Division. NASA's Office of STEM Engagement has a long history of cultivating a relationship and providing education coordination with Anne Arundel County. ▲

SANDRA VILEVAC / CODE 450
EXPLORATION AND SPACE COMMUNICATION (ESC) PROJECTS DIVISION
STEAM ENGAGEMENT: INTERN COORDINATOR & INSTRUCTIONAL DESIGNER

**STEAM Coordinator Sandra Vilevac discusses space communications with South River HS students.**

**The Women of Flight is a newly established community of practice led by Azita Valinia (Code 440) and Donna Swann (Code 400), and championed by Wanda Peters (Code 400).**

# GODDARD'S WOMEN OF FLIGHT

ONWARD AND UPWARD TOGETHER

This community focuses on creating opportunities for networking, mentoring, counseling for career advancement, work-life balance, and promoting visibility for women's contributions to NASA missions in the Flight Projects Directorate. The group engages the flight projects directorate community to promote gender equality in the workforce, maximize collaboration, and advance innovation. One of the initiatives that this group has recently put forward is promoting diversity (age, gender, ethnicity, etc.) on technical panels by developing a diverse pipeline of expertise to serve on review panels at various levels of project cycle (as well as high visibility NASA Headquarters panels such as Standing Review Boards). The initiative calls on collaboration between various directorates at GSFC and could prove to be a pilot program across the Agency to promote diversity on these highly specialized panels. The Women of Flight also partners with the GSFC Women Advisory Committee to promote this year's theme "Press for Progress" toward gender equality. Networking events and participation are open to all members of the flight projects directorate community. ▲

AZITA VALINIA / CODE 440
DEPUTY DIRECTOR, ASTROPHYSICS FLIGHT PROJECTS DIVISION

# EVS ANNUAL SURVEY

*opens May 10 2018!*

***Questions?***
*Contact Donna Swann (donna.j.swann@nasa.gov)*

*HELPING NEIGHBORS AT*

# SHEPHERD'S COVE

**This year the FPD Diversity and Inclusion (D&I) Committee has elected to dedicate resources and time to give back to the communities in Prince George's County, Maryland.**

One of the locations selected is Shepherd's Cove, an emergency shelter for women and children in Prince George's County. The facility is open 24 hours a day, 365 days a year and offers 100 beds to those in need. Their primary goal is to provide a clean and safe environment for the residents with the ultimate goal of having residents obtain transitional or permanent housing.

Over the past few months, a small sub-committee of the D&I team has volunteered their time to visit the shelter on a monthly basis to plan out the logistics for a Technology Learning Center sponsored by the GSFC FPD. Since the project's inception, the sub-committee has taken the initial steps to foster an ongoing and long-term relationship with Shepherd's Cove and United Communities against Poverty (UCAP). The team has developed a relationship with the staff and residents with the goal to identify their true needs and desires for the facility. In addition to building relationships with UCAP, the team has also organized a beautiful collection of donated, brand new books, that covers all age groups and many content areas, both fiction and non-fiction. This effort is just the first step in our partnership!

The next step in development is to gather donations from the Goddard community to assist our team refresh the room where the Technology Learning Center will be located. By summer 2018, the goal is to furnish the learning center with tables, chairs, and area rugs. If donation goals are exceeded, the team would like to provide various settings that are conducive to learning for a variety of ages and abilities. The last event for the summer is to host a full-day Saturday event in July/August when volunteers and residents will work together to paint a completed mural. As we get closer to this date, the Shepherd's Cove team will reach out with an interest form for volunteers. We hope that volunteers will include a variety of GSFC staff as well as the summer interns! Lastly, to conclude all of the room rehab efforts, we will have a ribbon-cutting ceremony this fall. This will coincide with the beginning of the school year for the resident children so as to dedicate the room to them.

Finally, during the 2018 holiday season, the Shepherd's Cove team is planning to host a fundraising holiday event in the Technology Learning Center. Our goal is to continue to grow our relationship with UCAP. We plan to have a sustainable relationship with Shepherd's Cove through additional service projects and through other events such as 'Dress for Success' and NASA professional mentoring. ▲

MARISSA LUEDTKE / CODE 429
D&I COMMITTEE

# FLIGHT PROJECTS

## LAUNCH SCHEDULE 2018


**7/2018**
Parker Solar Probe (PSP)


**6/2018**
Space Environment Testbed (SET)-1


**6/2018**
Ionospheric Connection Explorer (ICON)


**9/2018**
Space Ice, Cloud and land Elevation Satellite (ICESat)-2


**9/2018**
Meteorological Operational (MetOp-C)


**11/2018**
Robotic Refueling Mission (RRM)-3


**11/2018**
Global Ecosystem Dynamics Investigation (GEDI)


**12/2018**
High Resolution Mid-InfrarEd Spectrometer (HIRMES)

JUNE JULY AUGUST SEPTEMBER OCTOBER NOVEMBER DECEMBER